

MR3242107 (Review) 37-01 15-01 34-01

Colonus, Fritz (D-AGSB-MI); Kliemann, Wolfgang (1-IASU)

★Dynamical systems and linear algebra.

Graduate Studies in Mathematics, 158.

*American Mathematical Society, Providence, RI, 2014. xvi+284 pp.*

ISBN 978-0-8218-8319-8

This graduate-level textbook focuses on linear systems of first-order ordinary differential equations, both autonomous and nonautonomous, along with analogous difference equations. The long-term behavior of solutions (especially growth and decay rates and corresponding invariant structures) is the principal aspect of these equations that is studied. Intermixed with eight chapters devoted specifically to linear systems are three background chapters that develop chain transitivity and recurrence, Morse decompositions, and ergodic theory in a general setting. The authors are experts in control theory, and it is from that field that the most powerful applications in the book are drawn.

There are nine illustrations, all of them helpful. Like most instructional texts, this one could stand to have many more illustrations, especially because of the geometrical nature of the material. The authors have set rather modest prerequisites for the reader, so diagrams that would help develop the intuition could be quite beneficial.

There is considerable redundancy in the continuous-time and discrete-time analyses. This is, perhaps, unavoidable. In some chapters, the authors have chosen (probably wisely) to treat only one or the other of these two cases.

The authors appear to have made a substantial effort to give careful arguments. As a consequence, clarity is a virtue of this text. While it is not free of typographical errors, there appear to be fewer than are typically found in a first edition.

In the opinion of the reviewer, there is a shortage of high-quality textbooks in this area, and the book under review ought to be enthusiastically welcomed. It is clearly appropriate for a semester-long topics course. Despite its somewhat narrow focus, it could conceivably be combined with other material to provide the text for a general year-long course on ordinary differential equations and dynamical systems. This would take some work, but there's a good chance that it would be worth the effort.

*Christopher P. Grant*